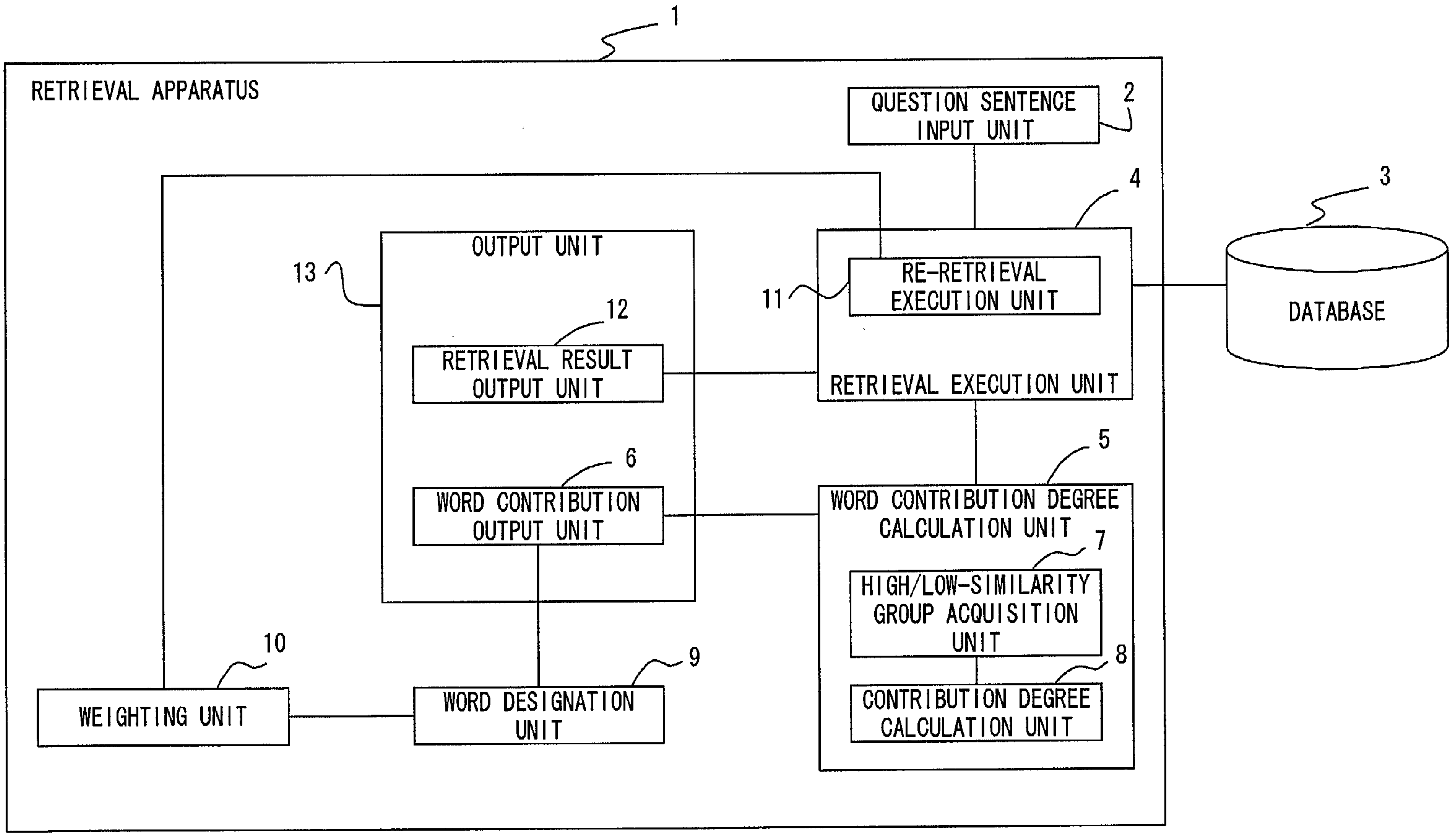
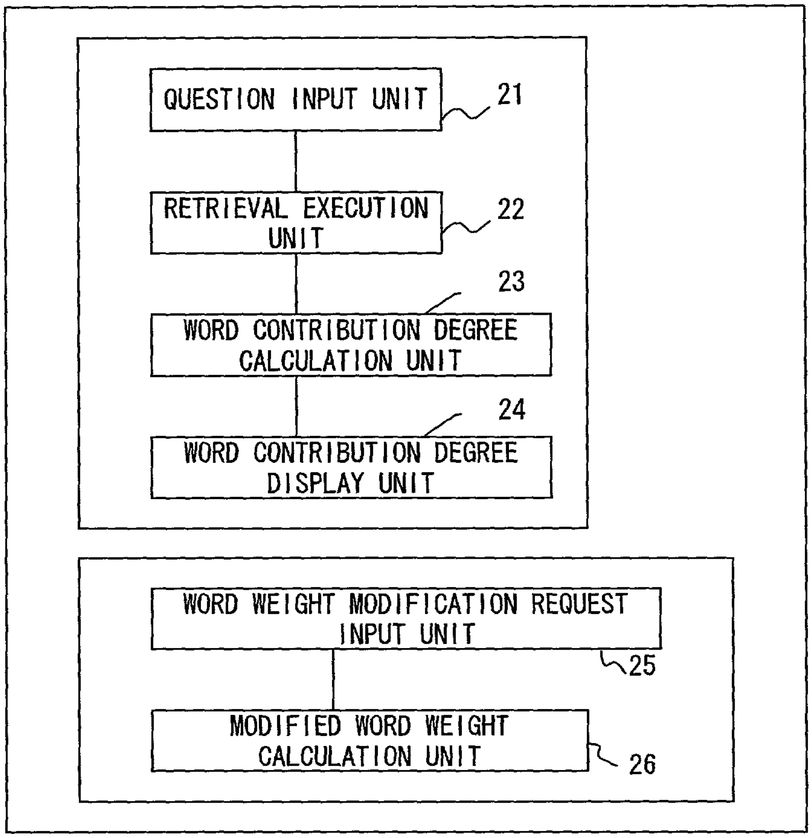

1
RETRIEVAL APPARATUS
QUESTION SENTENCE INPUT UNIT
2
4
3
DATABASE
13
OUTPUT UNIT
11
RE-RETRIEVAL EXECUTION UNIT
12
RETRIEVAL RESULT OUTPUT UNIT
RETRIEVAL EXECUTION UNIT
5
6
WORD CONTRIBUTION OUTPUT UNIT
WORD CONTRIBUTION DEGREE CALCULATION UNIT
7
HIGH/LOW-SIMILARITY GROUP ACQUISITION UNIT
10
9
8
WEIGHTING UNIT
WORD DESIGNATION UNIT
CONTRIBUTION DEGREE CALCULATION UNIT

F I G. 1


QUESTION INPUT UNIT
21
RETRIEVAL EXECUTION UNIT
22
23
WORD CONTRIBUTION DEGREE CALCULATION UNIT
24
WORD CONTRIBUTION DEGREE DISPLAY UNIT
WORD WEIGHT MODIFICATION REQUEST INPUT UNIT
25
MODIFIED WORD WEIGHT CALCULATION UNIT
26

F I G. 2

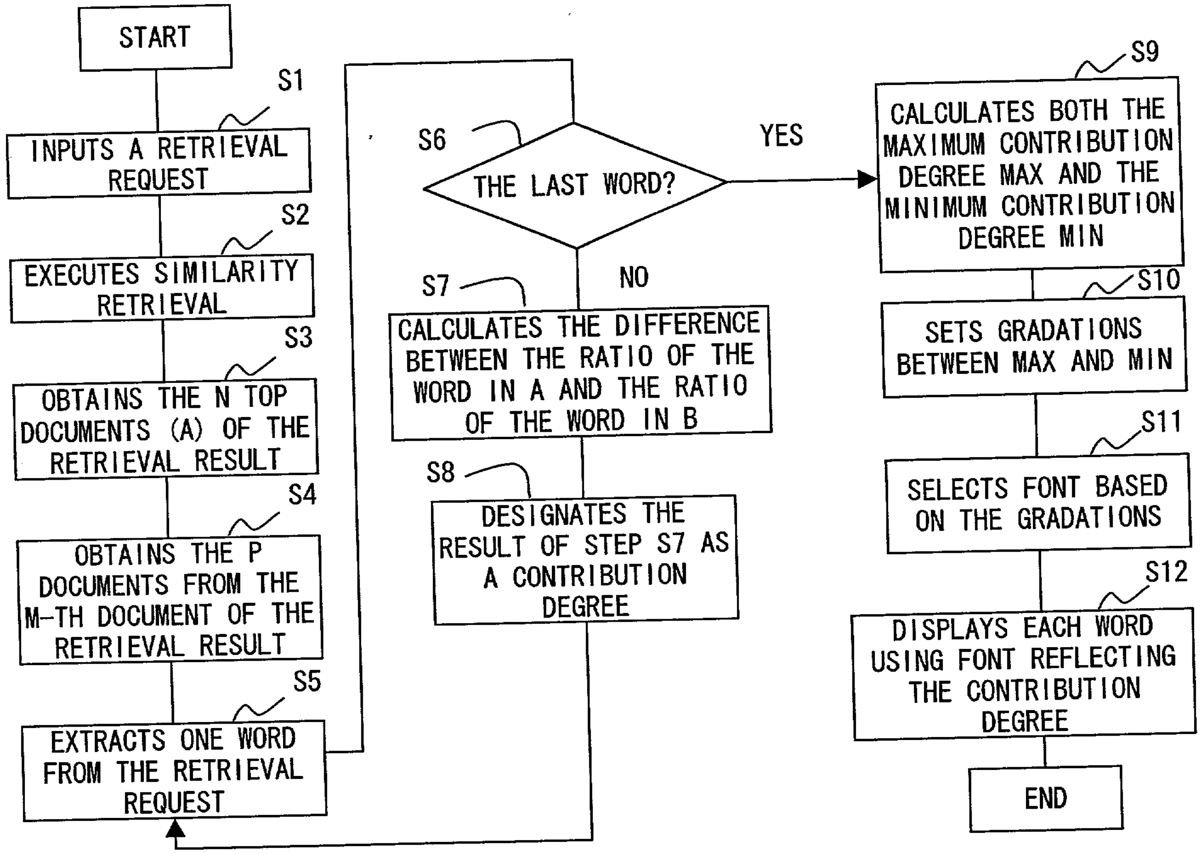

START
S1
INPUTS A RETRIEVAL REQUEST
S2
EXECUTES SIMILARITY RETRIEVAL
S3
OBTAINS THE N TOP DOCUMENTS (A) OF THE RETRIEVAL RESULT
S4
OBTAINS THE P DOCUMENTS FROM THE M-TH DOCUMENT OF THE RETRIEVAL RESULT
S5
EXTRACTS ONE WORD FROM THE RETRIEVAL REQUEST
S6
THE LAST WORD?
YES
NO
S7
CALCULATES THE DIFFERENCE BETWEEN THE RATIO OF THE WORD IN A AND THE RATIO OF THE WORD IN B
S8
DESIGNATES THE RESULT OF STEP S7 AS A CONTRIBUTION DEGREE
S9
CALCULATES BOTH THE MAXIMUM CONTRIBUTION DEGREE MAX AND THE MINIMUM CONTRIBUTION DEGREE MIN
S10
SETS GRADATIONS BETWEEN MAX AND MIN
S11
SELECTS FONT BASED ON THE GRADATIONS
S12
DISPLAYS EACH WORD USING FONT REFLECTING THE CONTRIBUTION DEGREE
END

FIG. 3

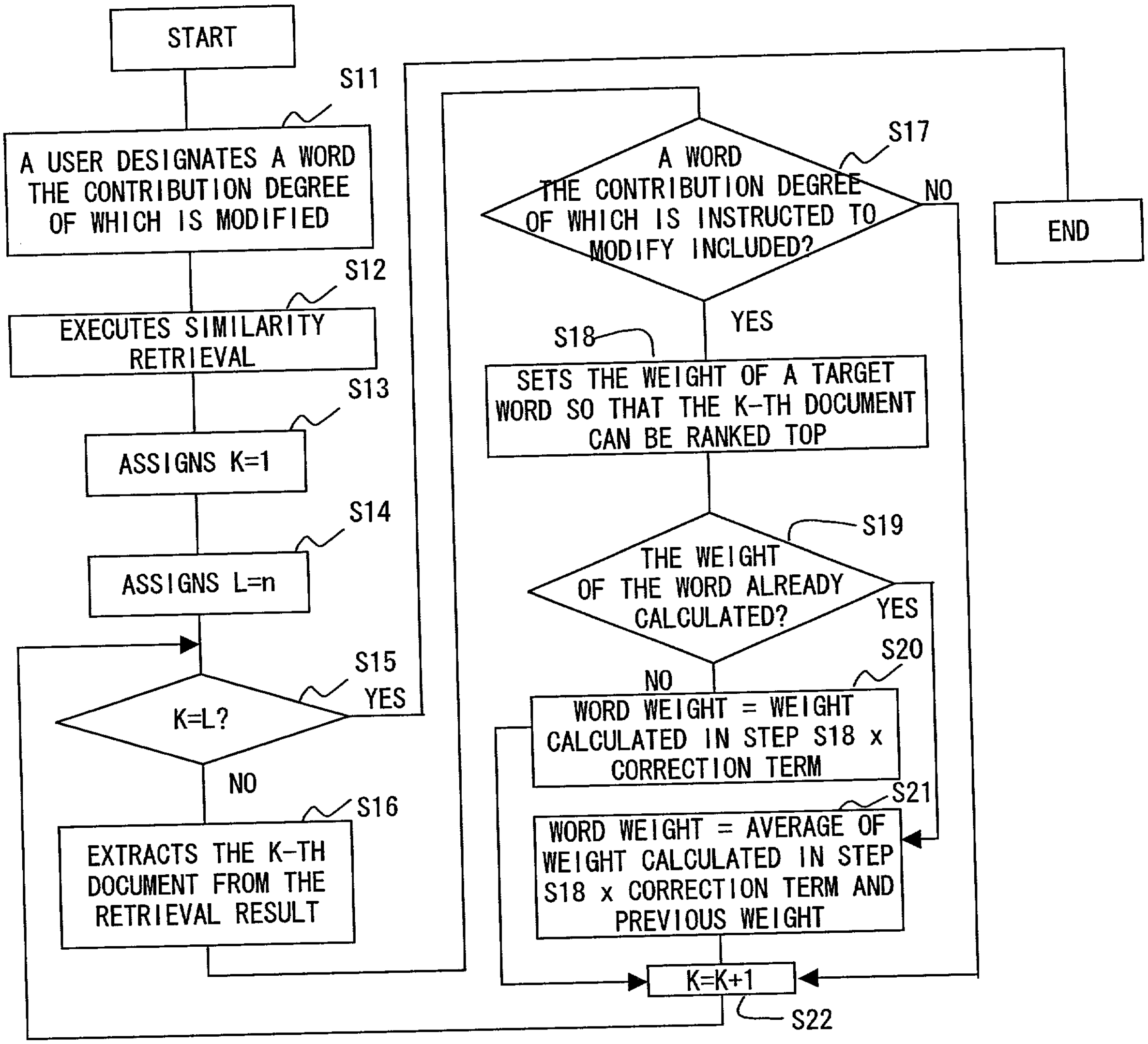

START
S11
A USER DESIGNATES A WORD THE CONTRIBUTION DEGREE OF WHICH IS MODIFIED
S12
EXECUTES SIMILARITY RETRIEVAL
S13
ASSIGNS K=1
S14
ASSIGNS L=n
S15
K=L?
YES
NO
S16
EXTRACTS THE K-TH DOCUMENT FROM THE RETRIEVAL RESULT
S17
A WORD THE CONTRIBUTION DEGREE OF WHICH IS INSTRUCTED TO MODIFY INCLUDED?
NO
END
YES
S18
SETS THE WEIGHT OF A TARGET WORD SO THAT THE K-TH DOCUMENT CAN BE RANKED TOP
S19
THE WEIGHT OF THE WORD ALREADY CALCULATED?
YES
NO
S20
WORD WEIGHT = WEIGHT CALCULATED IN STEP S18 x CORRECTION TERM
S21
WORD WEIGHT = AVERAGE OF WEIGHT CALCULATED IN STEP S18 x CORRECTION TERM AND PREVIOUS WEIGHT
K=K+1
S22

FIG. 4

- PURPOSE
  - SEARCHES FOR A WORD hybrid car
- QUESTION SENTENCE
  - INPUTS IN A NATURAL LANGUAGE (REQUEST FORMAT TO A SEARCHER)
  - TAKE TREC Query NO. 385 AS AN EXAMPLE
  - Identify documents that discuss the current status of hybrid automobile engines, (i.e., cars fueled by something other than gasoline only.) A relevant document may include research on non-gasoline powered engines or prototypes that may be fueled by natural gas, methanol, alcohol; cost to the consumer, health benefits derived; and shortcomings in horsepower and passenger comfort.

FIG. 5

- A = TOP 10 DOCUMENTS
- B = 200 DOCUMENTS FROM THE TOP 800 DOCUMENTS
- CALCULATION EXPRESSION
- CONTRIBUTION DEGREE CALCULATION EXPRESSION (Term Selection Value (Bougham formula))

$Tsv = (r/R - alpha * s/S) * w$
$alpha$ = parameter
$w = r/(R-r) / (n-r)/(N-n-R+r)$
r = NUMBER OF DOCUMENTS, INCLUDING A TARGET WORD, OF A
$R = A$
n = NUMBER OF DOCUMENTS, INCLUDING A TARGET WORD
$S = B$
s = NUMBER OF DOCUMENTS, INCLUDING A TARGET WORD, OF B
N = NUMBER OF ALL DOCUMENTS

FIG. 6

fuel	7.2
methanol	6.8
cars	6.1
gas	5.4
automobile	5.1
gasoline	4.8
natural	4.5
powered	3.7
alcohol	2.4
engines	2.2
consumer	2.1
passenger	2.0
prototypes	1.6
research	1.0
benefits	1.0
derived	0.9
health	0.7
hybrid	0.6

FIG. 7

1	Fuel、methanol、cars
2	gas、automobile、gasoline、natural
3	powered、alcohol、engines、consumer、passenger
4	prototype、research、benefits、derived、health、hybrid

FIG. 8

1	cars hybrid
2	gas 、automobile 、 gasoline 、natural
3	powered 、alcohol 、engines 、consumer 、passenger
4	Fuel, prototype、research、benefits、derived 、health、

MAXIMIZES THE CONTRIBUTION DEGREE OF A WORD hybrid

DROPS THE CONTRIBUTION DEGREE OF A WORD fuel

DELETES A WORD methanal

FIG. 9

	Cars	hybrid	gas	automobile	gasoline	natural	powered	alcohol	fuel
1	5	0	1	1	3	1	2	1	5
2	4	0	1	0	3	1	2	1	5
3	3	0	0	0	2	1	1	0	3
:									
8	2	1	2	1	1	0	2	1	1
9									
10									
:									
:									
20									
:									
:									
:									
1000									

FIG. 10

	Cars	hybrid	gas	automobile	gasoline	natural	powered	alcohol	fuel
1	5	0	1	1	3	1	2	1	5
2	4	0	1	1	3	1	2	1	5
3	3	0	0	0	2	1	1	0	3
.									
.									
8	2	1	2	1	1	0	2	1	1
9									

- CALCULATION FOR RANKING UP A DOCUMENT, INCLUDING A WORD Hybrid
  - THE SCORES OF THE TOP AND EIGHTH DOCUMENTS ARE 19 AND 11, RESPECTIVELY
  - TO RANK UP THE EIGHTH DOCUMENT TO THE TOP, MULTIPLY THE WORD Hybrid BY 9
  - WEIGHT OF THE WORD Hybrid 3 = 9 x 1/log(8)

- CALCULATION FOR RANKING DOWN A DOCUMENT, INCLUDING A WORD fuel
  - THE SCORES OF THE TOP AND EIGHTH DOCUMENTS ARE 19 AND 11, RESPECTIVELY
  - TO BRING THE TOP DOCUMENT CLOSE TO THE EIGHT, SET THE WORD fuel TO 1(THE MINIMUM)
  - WEIGHT OF THE WORD fuel 1/5 = 1/5 x 1/log (1)

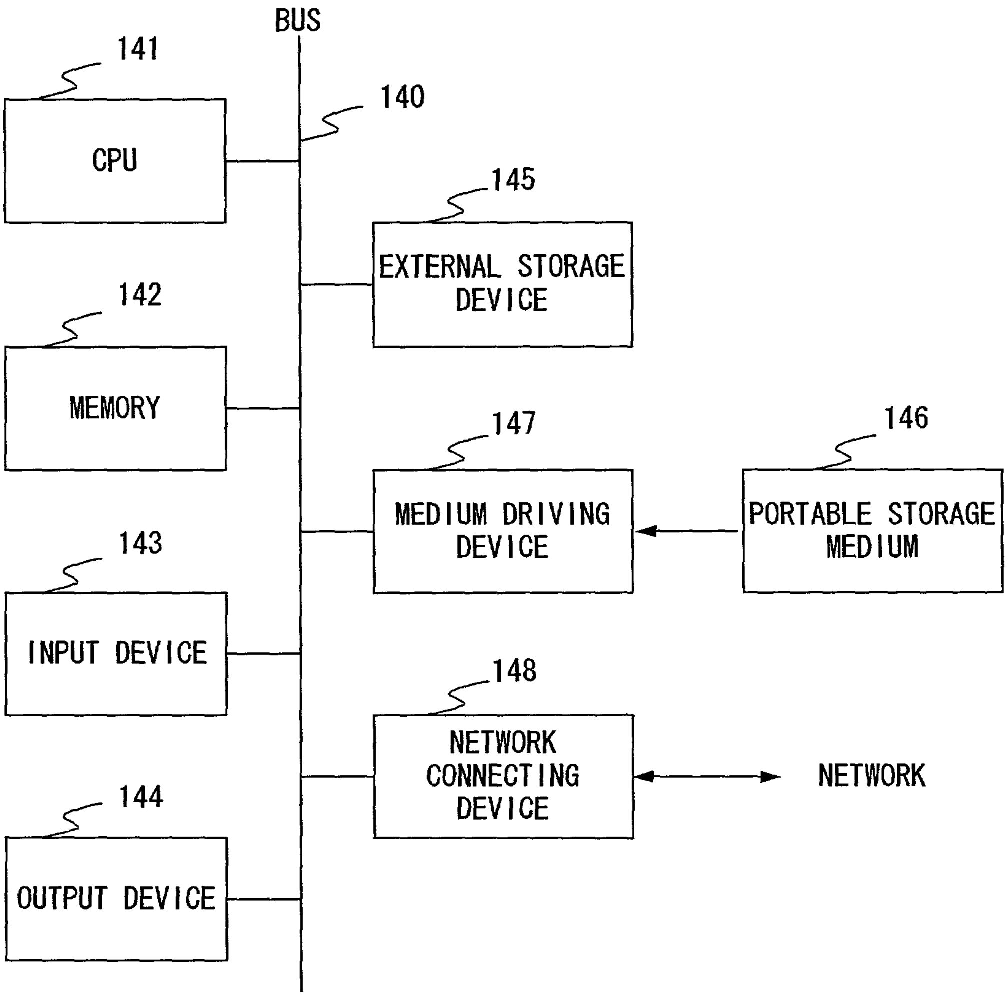
FIG. 11

hybrid	5.3
cars	5.1
gas	4.8
automobile	4.6
gasoline	4.2
natural	4.1
fuel	4.1
powered	3.7
prototypes	3.4
alcohol	2.1
engines	1.3
consumer	1.1
passenger	1.0
research	0.9
benefits	0.5
derived	0.3
health	0.2

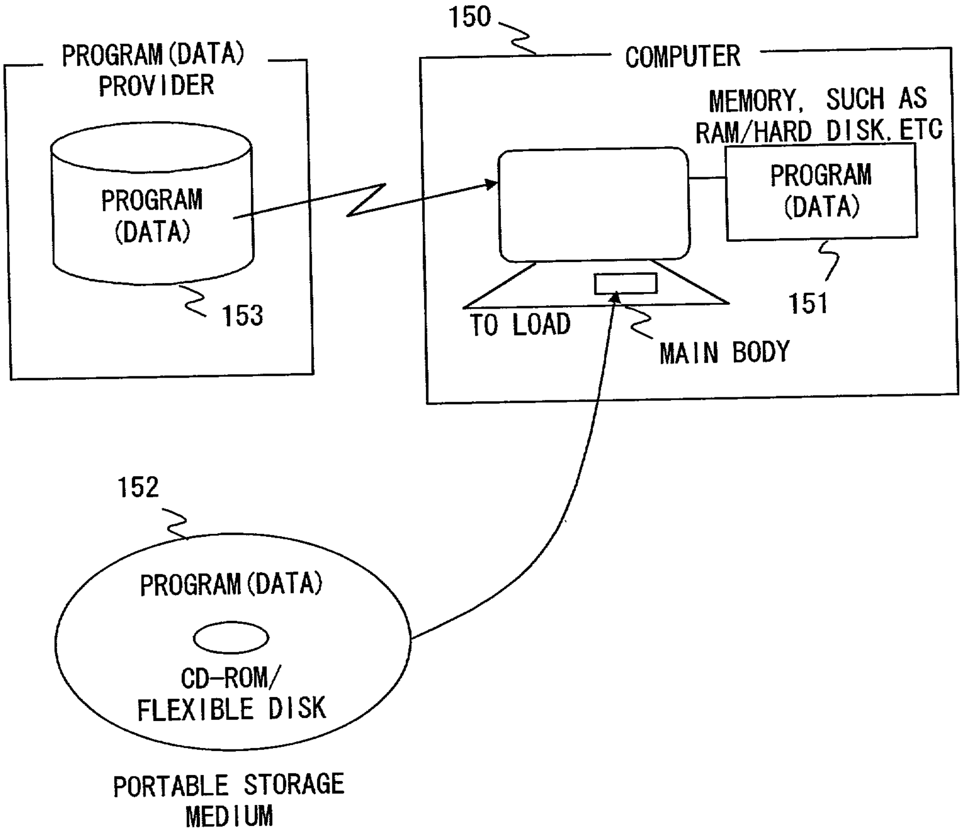
FIG. 12

- 1 hybrid ,cars ,gas , automobile
- 2 gasoline ,natural ,fuel ,powered,prototypes
- 3 alcohol engines consumer passenger
- 4 research , benefits, derived, health

FIG. 13


BUS
141
CPU
140
145
EXTERNAL STORAGE DEVICE
142
MEMORY
147
MEDIUM DRIVING DEVICE
146
PORTABLE STORAGE MEDIUM
143
INPUT DEVICE
148
NETWORK CONNECTING DEVICE
NETWORK
144
OUTPUT DEVICE

F I G. 1 4


150
COMPUTER
PROGRAM (DATA) PROVIDER
PROGRAM (DATA)
153
MEMORY, SUCH AS RAM/HARD DISK, ETC
PROGRAM (DATA)
151
TO LOAD
MAIN BODY
152
PROGRAM (DATA)
CD-ROM/ FLEXIBLE DISK
PORTABLE STORAGE MEDIUM

F I G. 1 5